

What is claimed is:

- 5 *sub H1*
1. A capacity modulated compressor comprising:
 - a compression mechanism having a compression chamber therein,
 - a suction inlet for supplying suction gas to the compression chamber and a movable member operative to vary the volume of said compression chamber;
 - a power source operatively connected to effect movement of said movable member to thereby compress gas drawn into said compression chamber through said suction inlet;
 - a valve provided adjacent said suction inlet, said valve being operable between open and closed positions to cyclically allow and prevent flow of suction gas into said compression chamber; and
 - control apparatus for actuating said valve between said open and closed positions, said control apparatus being operative to cycle said valve such that its cycle time is substantially smaller than the time constant of the load on said compressor.
 - 10 2. A capacity modulated compressor as set forth in claim 1 wherein said valve is positioned in close proximity to said compression chamber.
 3. A capacity modulated compressor as set forth in claim 1 wherein said valve is a bidirectional valve.
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4. A capacity modulated compressor as set forth in claim 1 wherein at least one of said cycle time and the time duration said valve is in said closed position is varied in response to sensed operating conditions.

5. A capacity modulated compressor as set forth in claim 4 wherein said power source continues to effect movement of said movable member as said valve is cycled between said open and closed positions.

6. A capacity modulated compressor as set forth in claim 4 wherein said cycle time and said time duration are varied in response to said sensed operating condition.

7. A capacity modulated compressor as set forth in claim 1 wherein said valve is actuated by pressurized fluid.

8. A capacity modulated compressor as set forth in claim 7 further comprising a control valve operative to control the flow of pressurized fluid to said valve.

9. A capacity modulated compressor as set forth in claim 8 wherein said control valve is a solenoid actuated valve.

10. A capacity modulated compressor as set forth in claim 7 wherein said pressurized fluid is supplied from said compression mechanism.

11. A capacity modulated compressor as set forth in claim 1 wherein said power source comprises an electric motor.

12. A capacity modulated compressor as set forth in claim 11 wherein said control module operates to vary an operating parameter of said electric motor when said valve is in said closed position so as to thereby improve the operating efficiency of said motor.

13. A capacity modulated compressor as set forth in claim 12 wherein said operating parameter of said motor is varied a predetermined time period after said valve is moved to said closed position.

14. A capacity modulated compressor as set forth in claim 1 wherein said compression mechanism is a reciprocating piston compressor.

15. A capacity modulated compressor as set forth in claim 14 wherein said reciprocating piston compressor includes a plurality of pistons and cylinders, said valve being operative to prevent flow of suction gas to all of said cylinders.

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16. A capacity modulated compressor as set forth in claim 15 wherein said valve operates to prevent flow of suction gas to all of said cylinders simultaneously.

17. A capacity modulated compressor comprising:

a hermetic shell;

a compression mechanism disposed within said shell, said compression mechanism including a compression chamber defined in part by a moveable member movable, said moveable member operating to vary the volume thereof;

a drive shaft rotatably supported within said shell and drivingly coupled to said movable member;

a suction inlet passage for supplying suction gas to said compression chamber from a source remote from said shell;

a valve within said suction inlet passage, said valve being actuatable between an open position to allow flow of suction gas through said inlet passage and a closed position to substantially prevent flow of suction gas through said inlet passage;

a controller for cyclically actuating said valve to an open position for first predetermined time periods and to a closed position for second predetermined time periods, the ratio of said first predetermined time period to the sum of said first and second predetermined time periods being less than a given load time constant and determining the percentage modulation of the capacity of said compressor.

18. A capacity modulated compressor as set forth in claim 17 wherein said valve is a bidirectional valve and is actuatable to said closed position by pressurized fluid.

19. A capacity modulated compressor as set forth in claim 18 further comprising a solenoid valve actuatable by said controller to control flow of said pressurized fluid to said valve.

20. A capacity modulated compressor as set forth in claim 19 wherein said pressurized fluid is discharge gas from said compressor.

21. A capacity modulated compressor as set forth in claim 17 wherein said valve is positioned in close proximity to said compression chamber.

22. A capacity modulated compressor as set forth in claim 17 wherein said compressor is a refrigeration compressor.

23. A capacity modulated compressor as set forth in claim 17 wherein said compressor is an air compressor.

24. A capacity modulated compressor as set forth in claim 17 wherein said compressor is a rotary compressor.

25. A capacity modulated compressor as set forth in claim 17 wherein said compressor is a scroll compressor.

26. A capacity modulated compressor as set forth in claim 17 wherein said sum of said first and second time periods is less than one half of said load time constant.

27. A capacity modulated compressor as set forth in claim 17 further comprising a motor for rotatably driving said drive shaft, said valve being actuatable between said open and closed positions while said motor continues to rotatably drive said drive shaft.

28. A capacity modulated compressor as set forth in claim 27 wherein said controller operates to vary an operating parameter of said motor between periods in which said valve is in said closed position and in said open position to thereby improve the operating efficiency of said motor.

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29. A method of modulating the capacity of a compressor forming a part of a cooling system to accommodate varying cooling load conditions comprising:

5 sensing an operating parameter of said cooling system, said parameter being indicative of the system load;

 determining a cycle frequency of a maximum duration which will minimize variation in the suction pressure of refrigerant being supplied to said compressor;

10 determining a first time period during which suction gas will be supplied to said compressor and determining a second time period during which suction gas will be prevented from flowing to said compressor, said first and second time periods being equal to said cycle frequency; and

15 pulsing a valve between open and closed positions for said first and second time periods respectively to thereby modulate the capacity of said compressor in response to said system operating parameter.